USGS Science in the Northern Gulf

Dawn Lavoie
Science Coordinator: Gulf of Mexico

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Biloxi, MS

U.S. Department of the Interior
U.S. Geological Survey

Scientific Discipline Programs

- Science for sound management and conservation of U.S. biological resources

- Basic geospatial data, access to and new applications of these data, and other earth science information, for users worldwide
- Objective, reliable earth-science information on geologic hazards, geologic resources, and U.S. geologic framework
- Hydrologic information and understanding for best use and management of U.S. water resources

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HABITAT IDENTIFICATION

- **PHINS – Priority Habitat Information System**
- **Flashmap – Florida Shelf Habitat Mapping**

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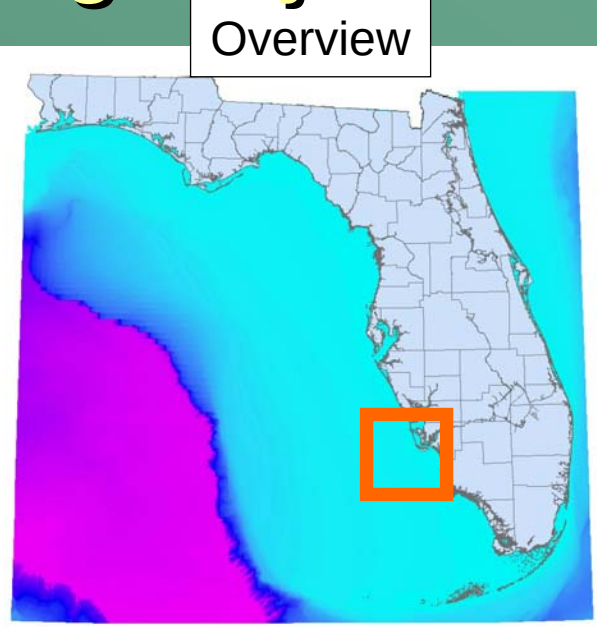
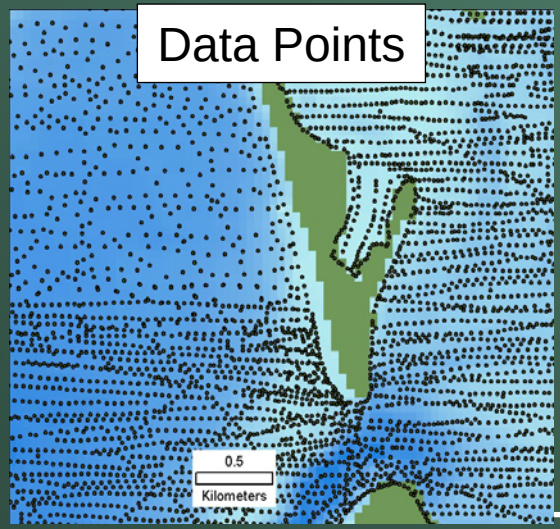
Florida Shelf Habitat Mapping Project

- Approximately 11 million data points
- 50 m pixel raster interpolation using inverse-distance weighted method
- 1 m contours derived from raster map
- Developed with ESRI ArcGIS 9.2

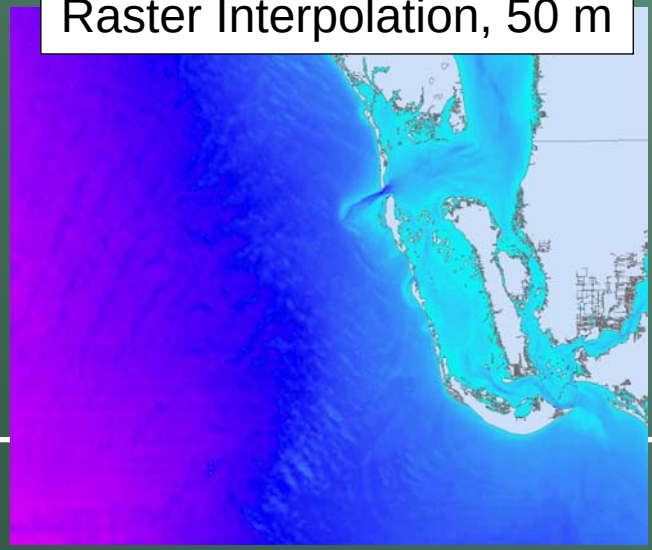
Overview



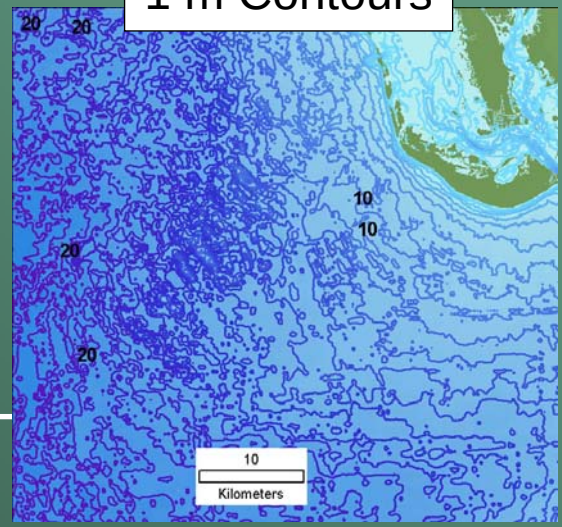
Data Points



Raster Interpolation, 50 m



1 m Contours



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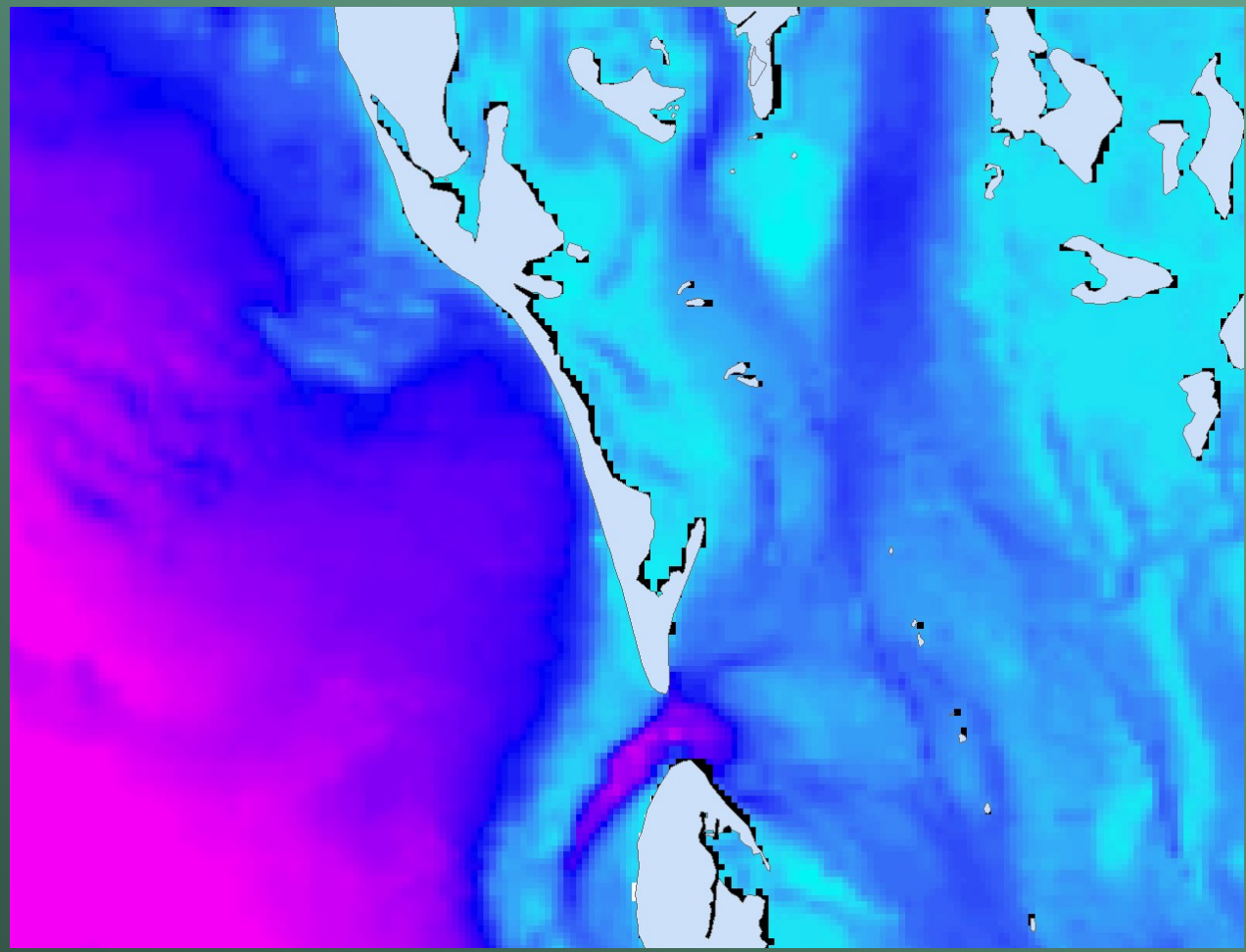
Florida Shelf Habitat (FLaSH) Map Project

Zoom from Florida Shelf Extent to Captiva Pass



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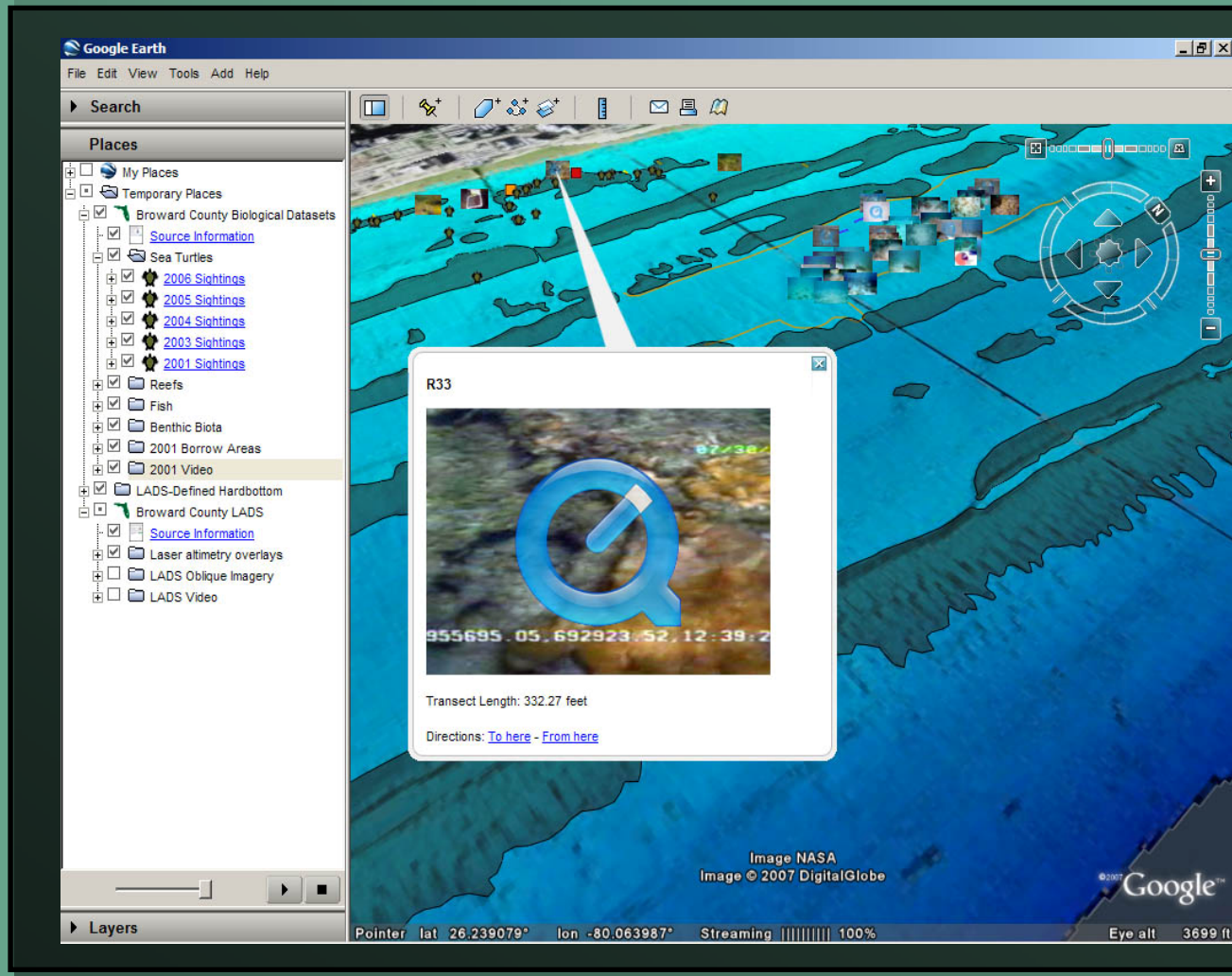
Florida Shelf Habitat (FLaSH) Map Project

USGS science for a changing world

Multimedia presentation of georeferenced materials including:

- Aerial photography
- Laser altimetry-derived coverages and oblique renderings
- Underwater photography and video for points & transects (also from FLaSH website)
- Point count data from surveys of biota and sediment
- Detailed bathymetric contours from traditional sources



RESTORATION

- **Regional Sediment Master Plan – collaboration with NOAA & USCOE**
- **Developed ecosystem models to forecast the habitat structure and succession following hurricane disturbance**
- **Ecosystem modeling in Florida, ATLSS (Across Trophic Level System Simulation), is geared towards species response in Everglades**

- **Science -**

  sea-level rise, ecosystem vulnerability, subsidence (LA, MS)

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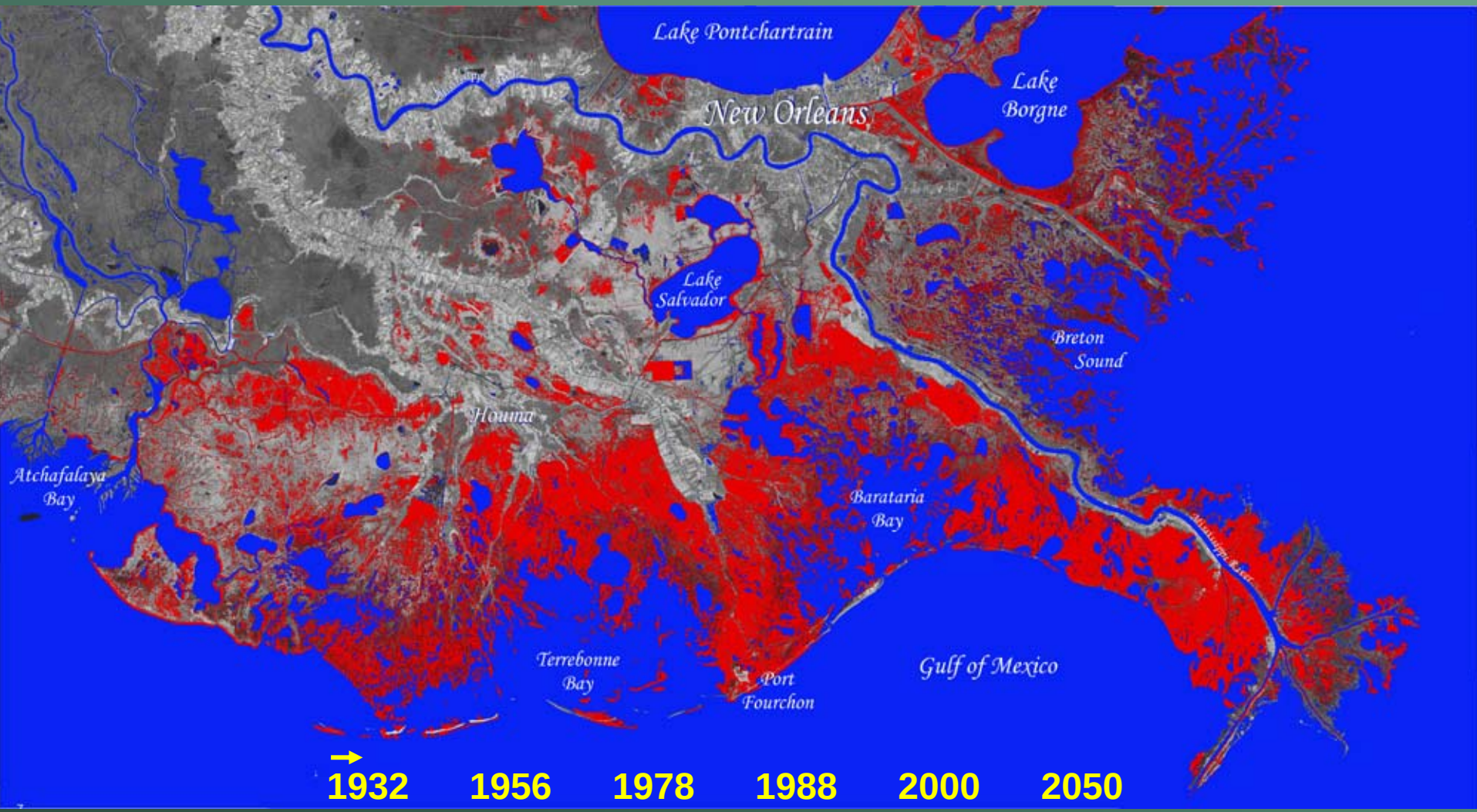
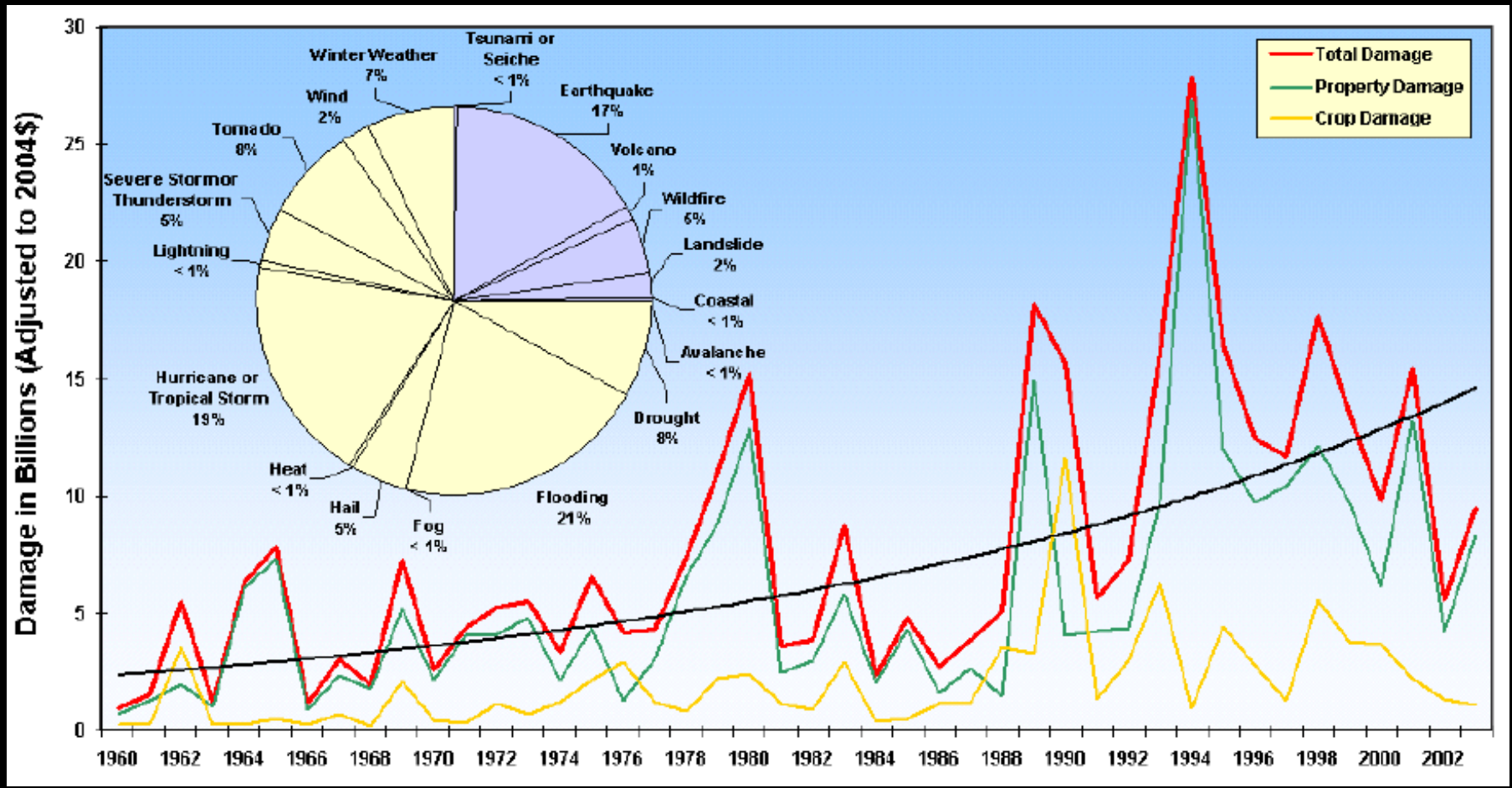
USGS Published Landloss Since 1932 and Predicted Louisiana Coastline by 2050 Projected For the Next 45 Years



The Increasing Cost of Natural Disasters



Source: Cutter, SL, 2005, The role of vulnerability science in disaster preparedness and response. Report to the Research Subcommittee of the US House of Representive's Committee on Science.

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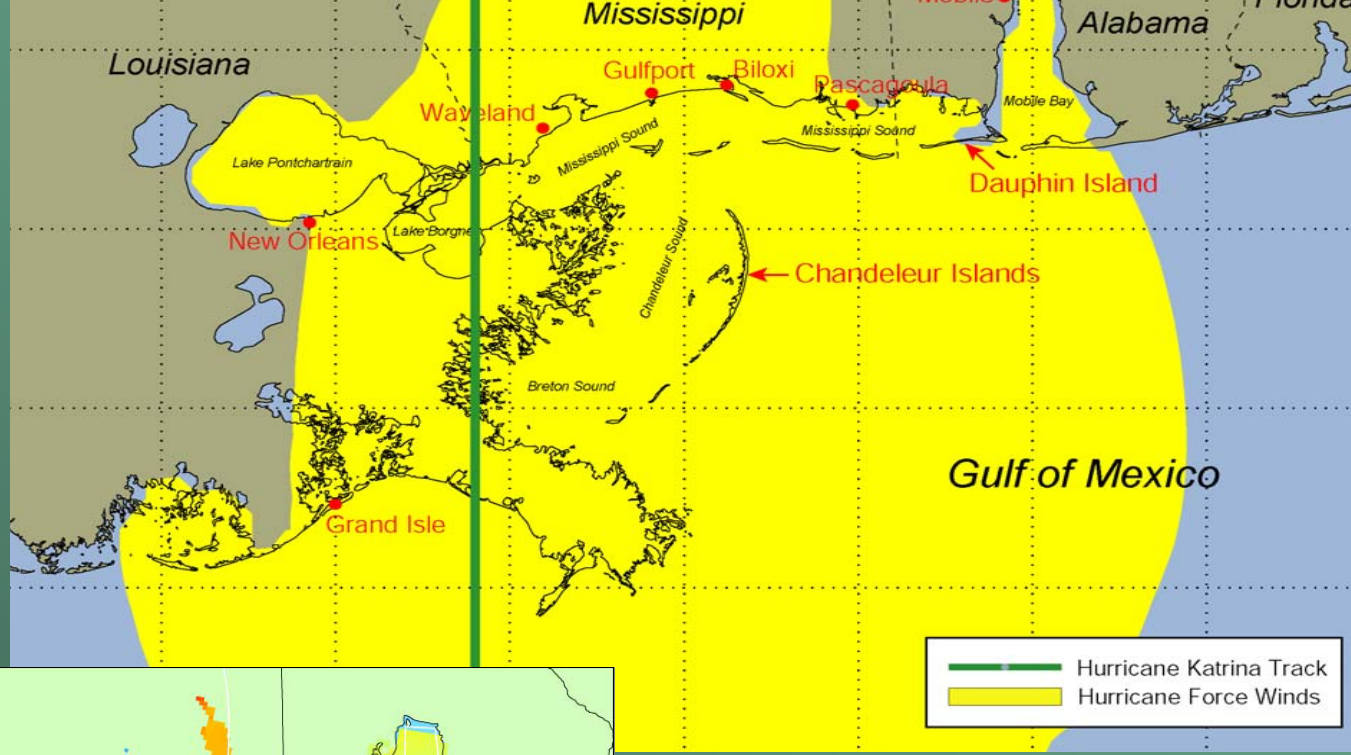
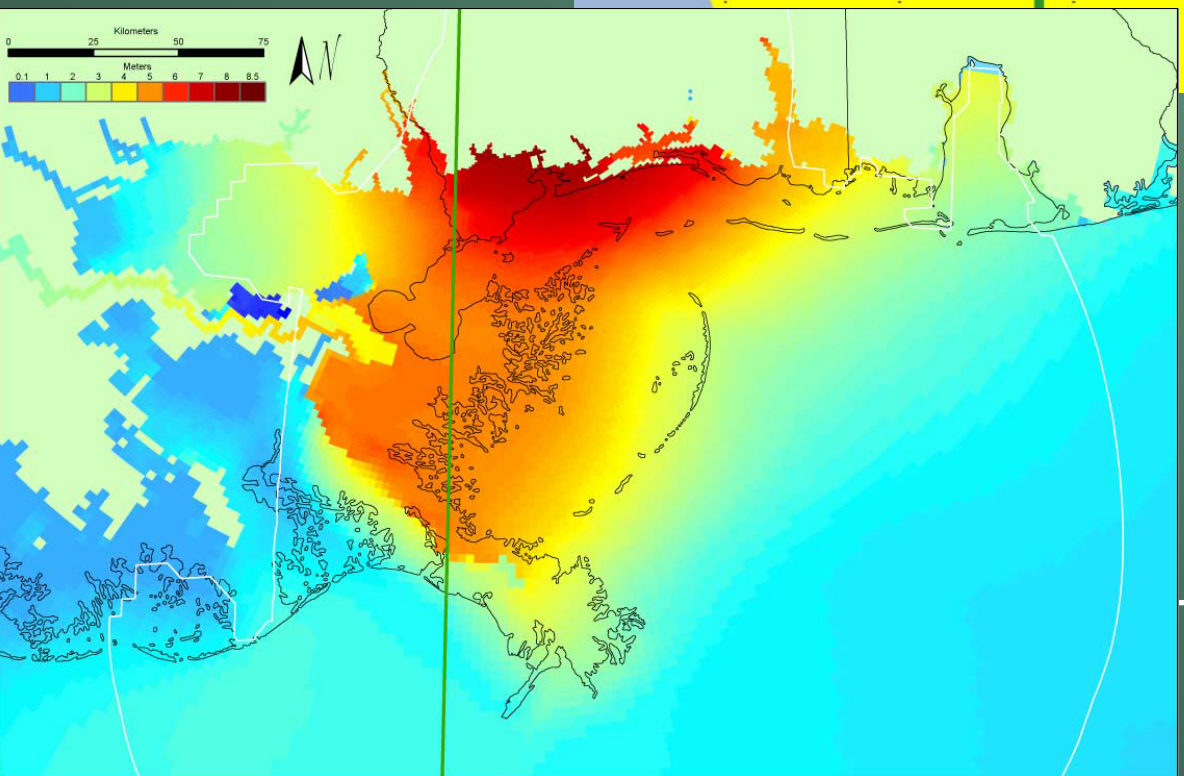
Hurricane force winds

Data from NOAA Hurricane Research Division





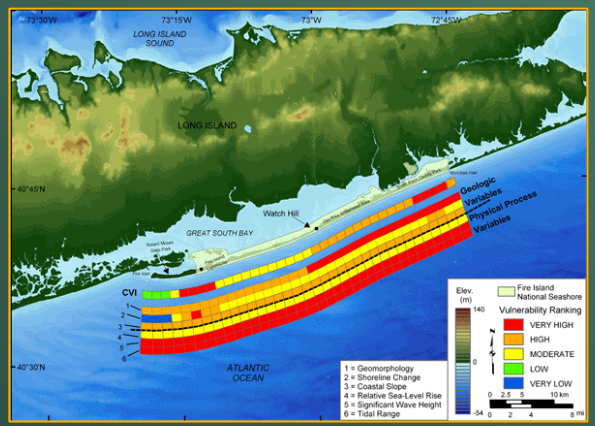
Storm Surge

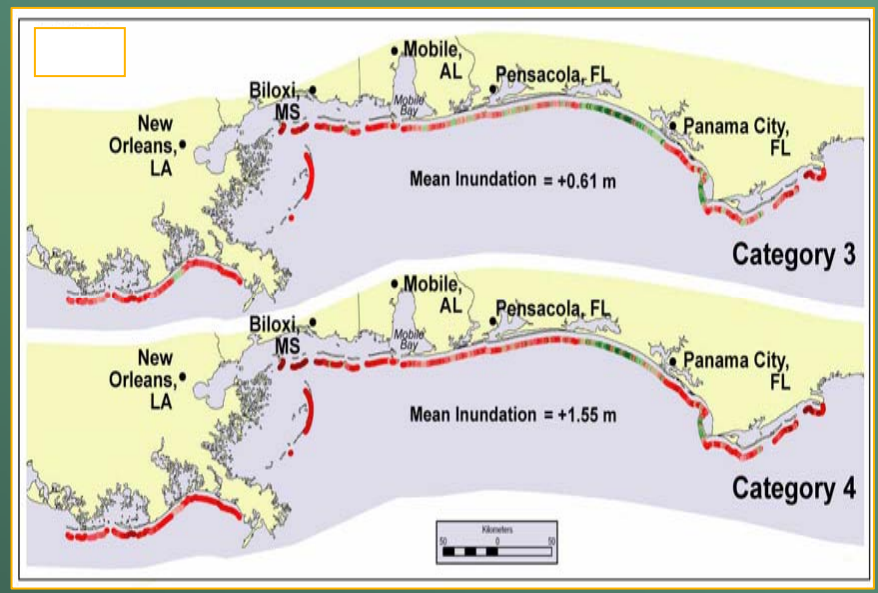
NHC SLOSH Model

Assessment of Coastal Change Hazards: Sea-level Rise

- Preliminary coastal vulnerability assessments
- Geomorphic and predictive modeling

US Climate Change Science Program
www.climatescience.gov





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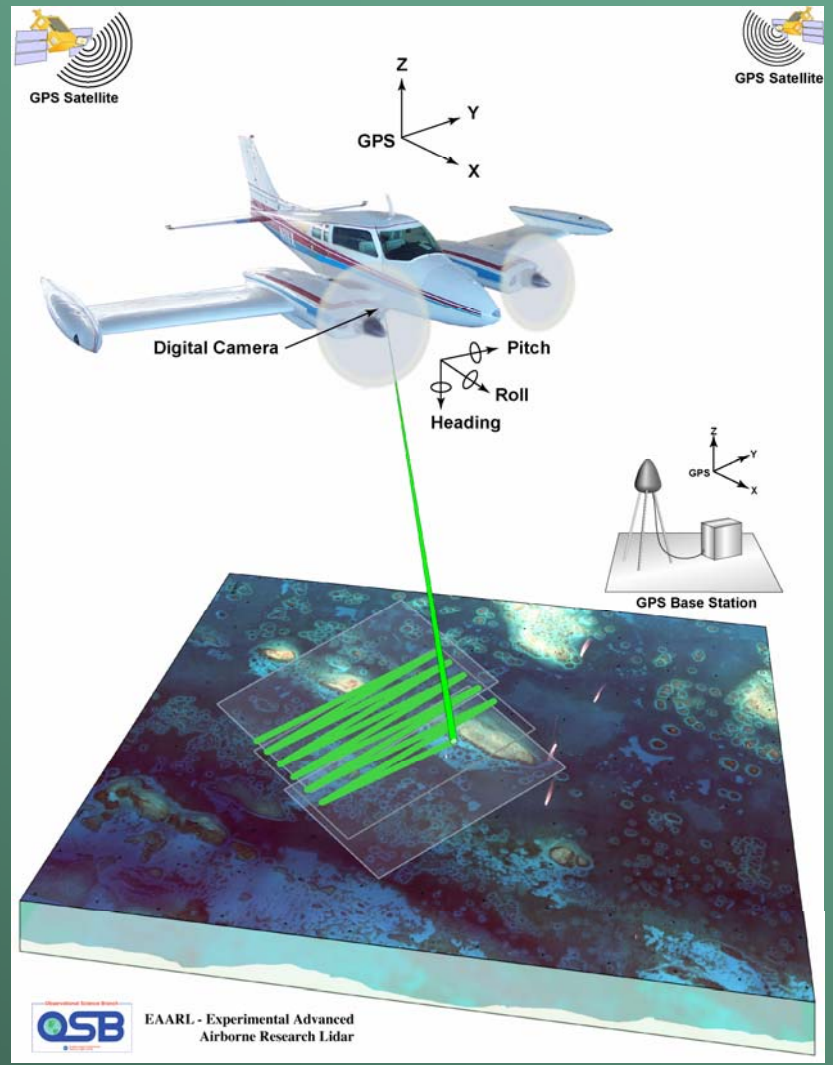
National Coastal Assessment and Extreme Storms

Cooperative program between USGS and NASA, airborne lidar (NASA's EAARL - Experimental Advanced Airborne Research Lidar) is used to survey beaches and dunes.



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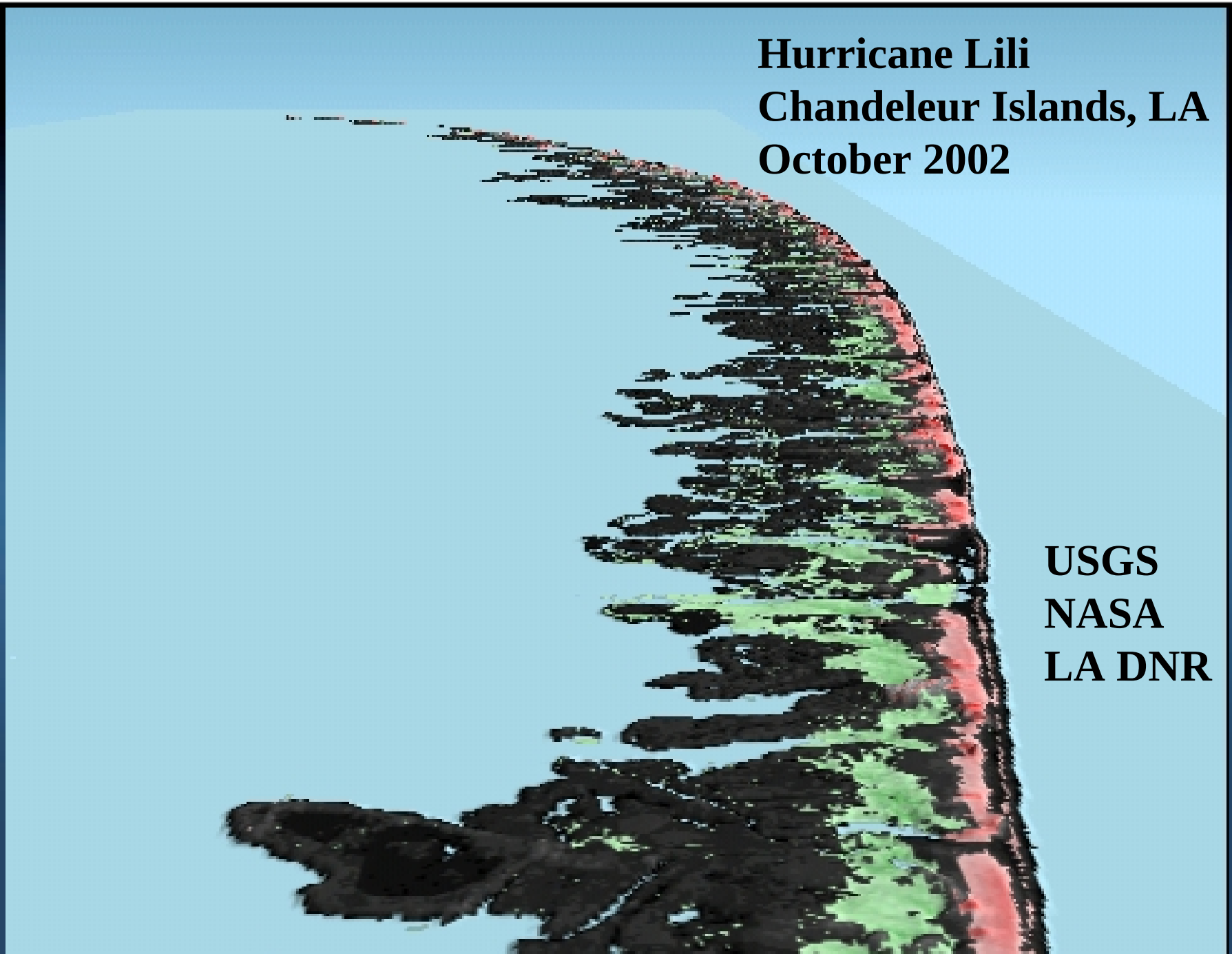
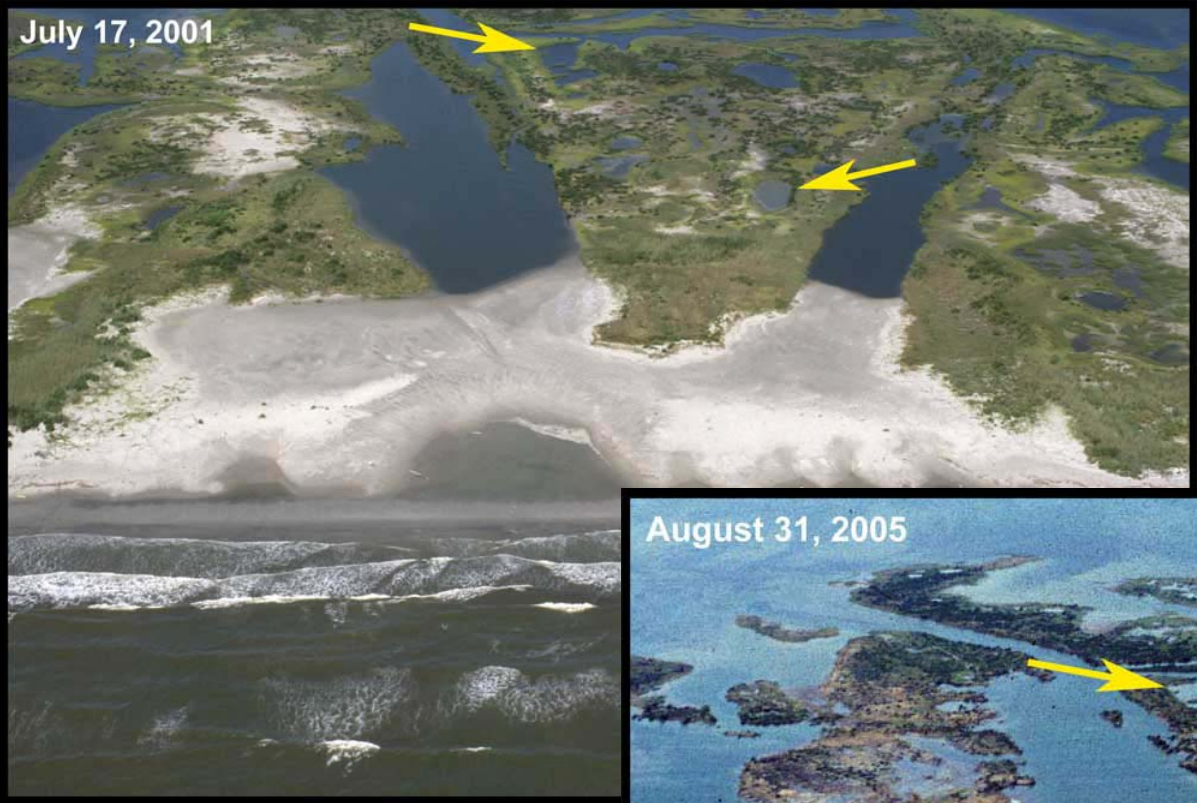


Hurricane Lili
Chandeleur Islands, LA
October 2002

USGS
NASA
LA DNR

Earthquakes ★ Floods ★ Hurricanes ★ Landslides ★ Tsunamis ★ Volcanoes ★ Wildfires



Pre Katrina

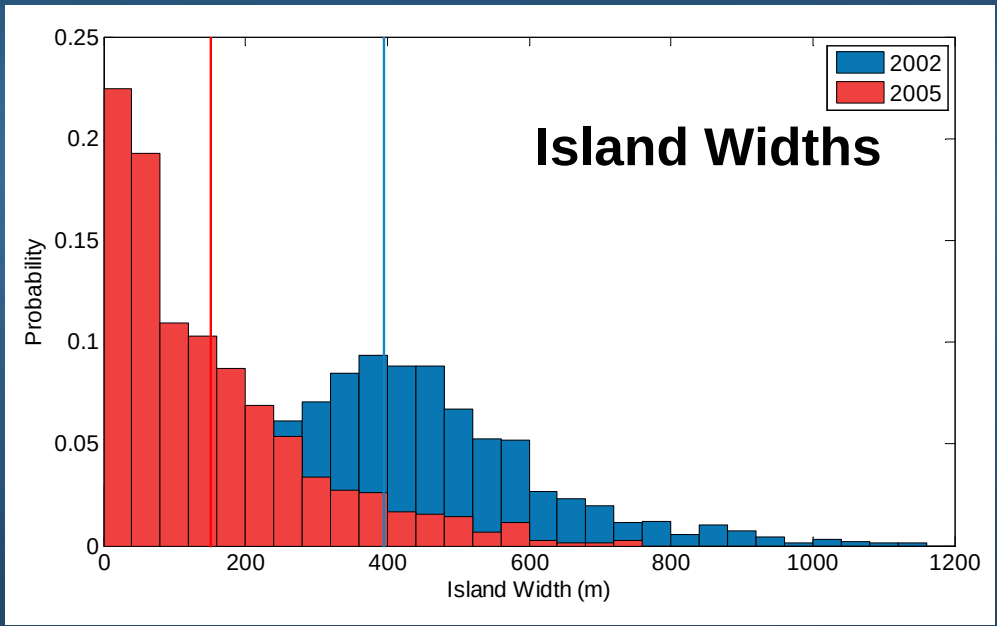
Post Katrina

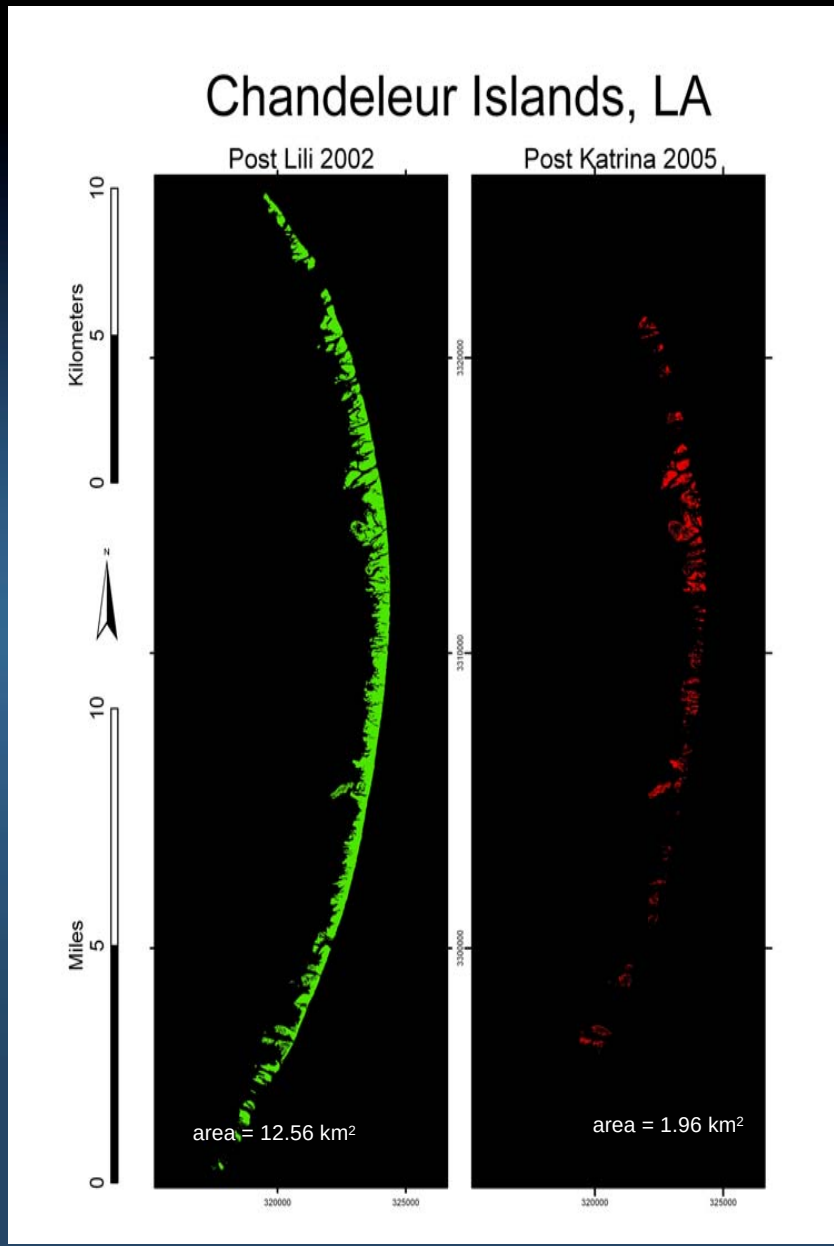
USGS

Island Area and Volume (% change)

$\Delta A = -84.4\%$

$\Delta V = -91.7\%$





Barrier Island Comprehensive Monitoring (BICM) USGS/UNO/LDNR

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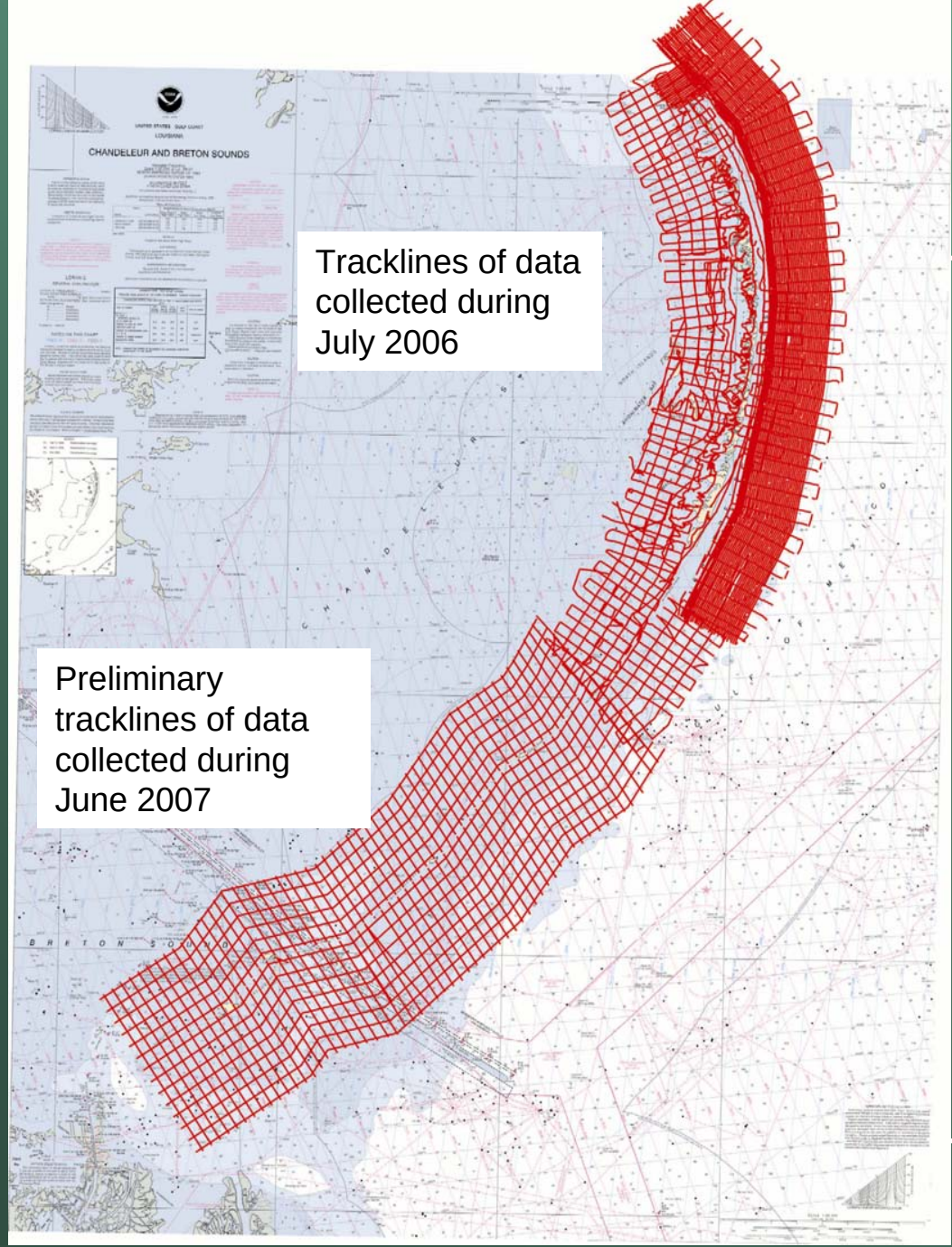
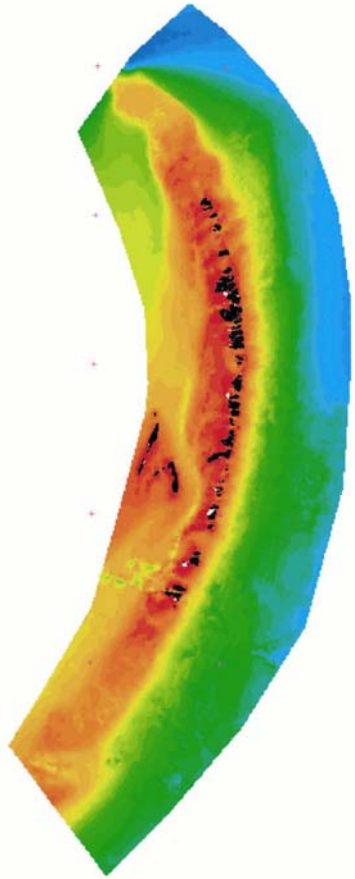
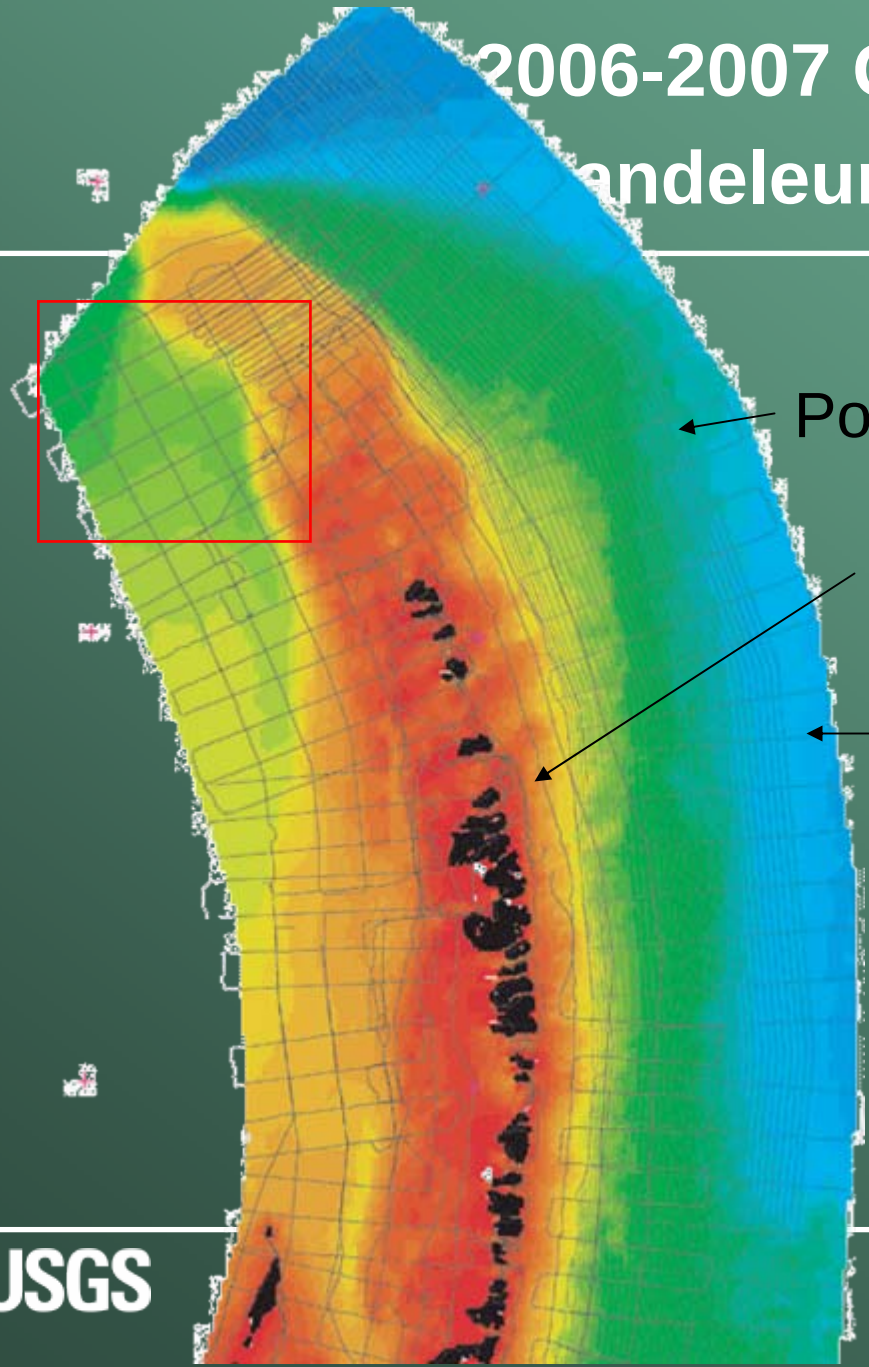


Final gridded dataset for northern Chandeleur Islands



Survey vessels onsite, northern Chandeleur Is. Photo from Times-Picayune

2006-2007 Geophysical Surveys
ndeleur Islands, La.



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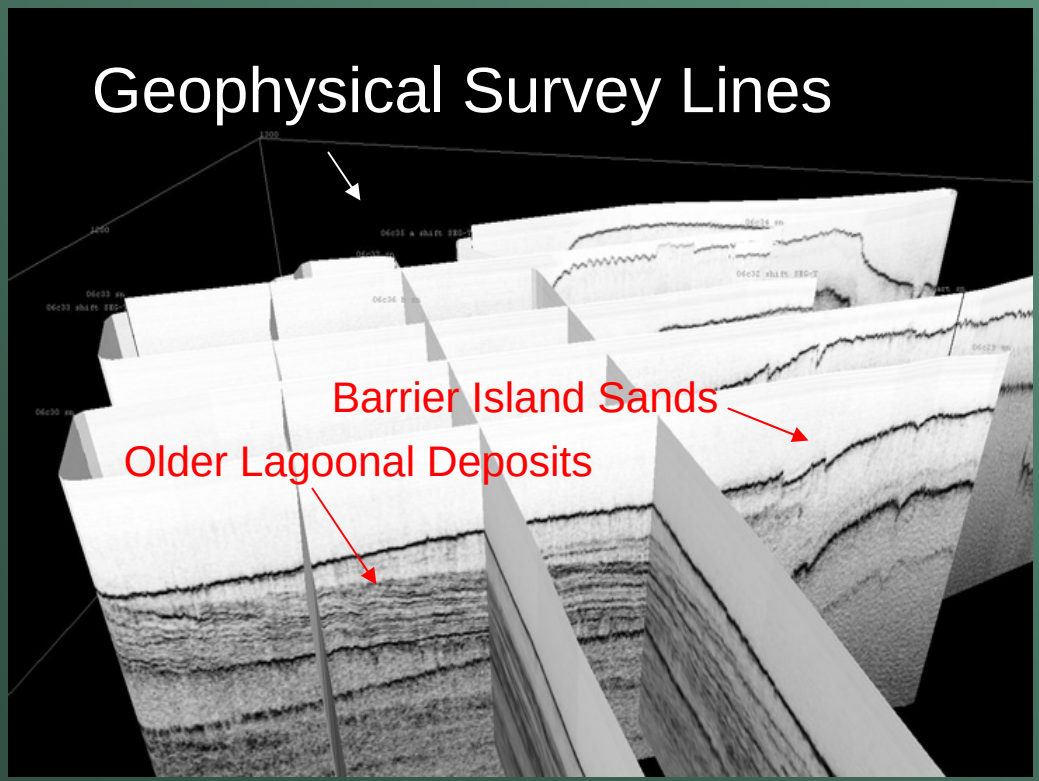
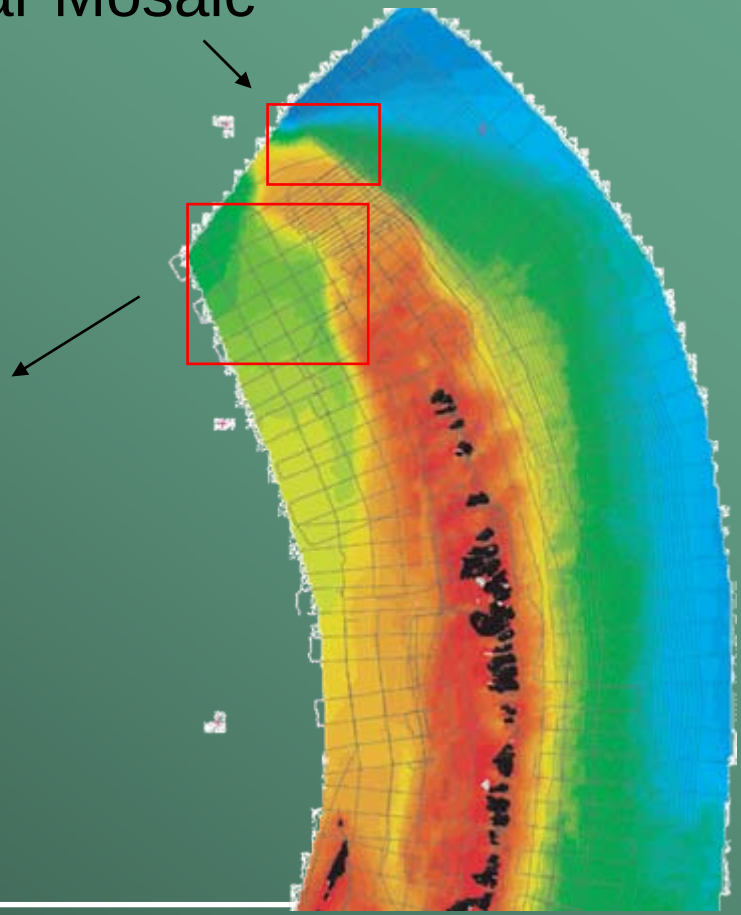
2006-2007 Geophysical Surveys
Chandeleur Islands, La.

Sidescan Sonar Mosaic





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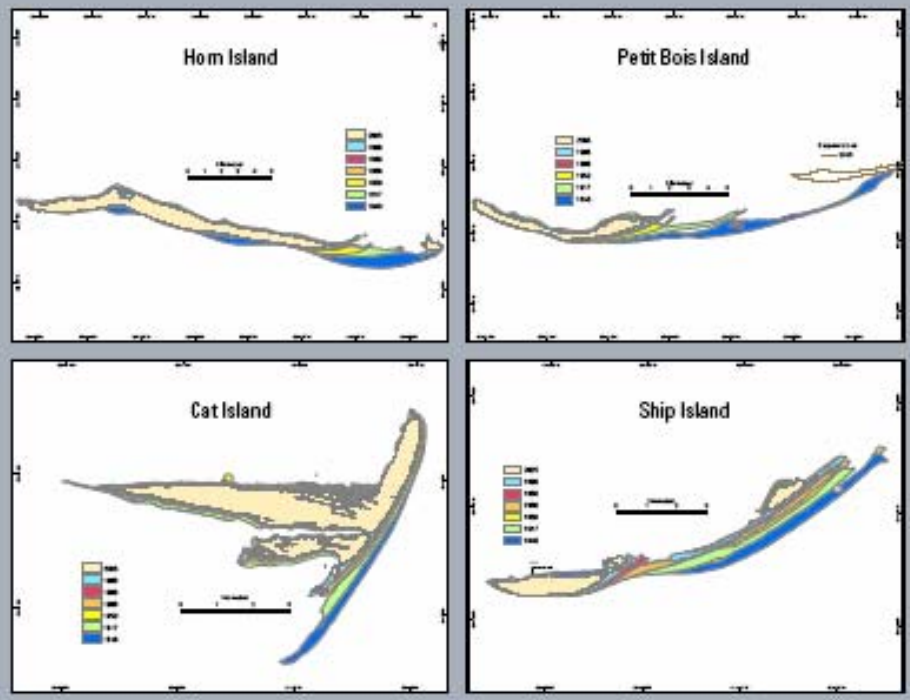
HISTORICAL CHANGES IN THE MISSISSIPPI-ALABAMA BARRIER ISLANDS AND THE ROLES OF EXTREME STORMS, SEA LEVEL, AND HUMAN ACTIVITIES

Robert A. Morton



Open-File Report 2007-1161

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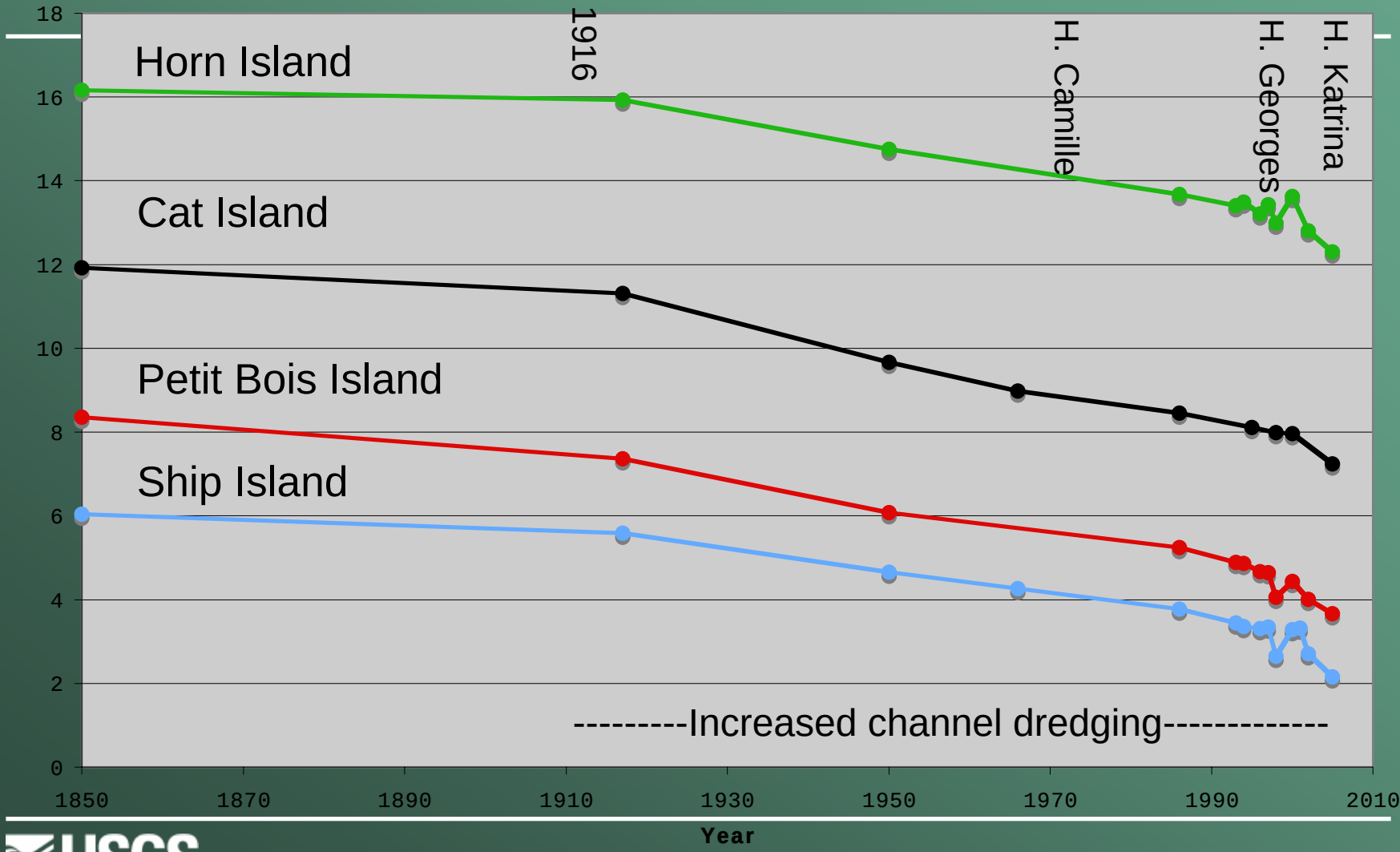
Mississippi Barrier Islands
Land Loss 1850-2005



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Northern Gulf Coast Ecosystem Change and Hazard Susceptibility Project

Geologic Discipline – Coastal and Marine Geology Program

Project Chief: John Brock
Project Start Date: October 1, 2006
Project End Date: September 30, 2012

John C. Brock, Donald Cahoon, Glenn Guntenspergen, Mark Kulp, Dawn Lavoie, Robert Morton, Shea Penland, Amar Nayegandhi, Richard Poore, Kathryn Smith, Peter Swarzenski, and David Twichell

U.S. Department of the Interior
U.S. Geological Survey

- **Major river systems: the Atchafalaya, Mississippi, Pearl, Pascagoula, Escatawpa, and Mobile Rivers.**
- **Covers the low relief Gulf Coastal Plain underlain by Holocene and Pleistocene sediments.**

GOAL

Determine the susceptibility of northern Gulf Coast region ecosystems and human communities to catastrophic change due to severe storms now and throughout the next 100 years.

- **Responds to the need for increased knowledge of *landscape evolution on geologic to human time scales*, and future projections.**

  Landscape complexity requires an appropriately time- and space-scaled "*coastal system science*" approach that deals with the response of linked elements resulting from multiple stressors and influences.

EVOLUTION OF NORTHERN GULF OF MEXICO COAST BARRIER ISLANDS

Goal:

- **Examine historical changes in the land area of Mississippi-Alabama barrier islands between the mid-1800s and 2005 using historic maps and aerial photographs, and**

- **Understand the processes by which severe storms act to abruptly modify these barriers.**

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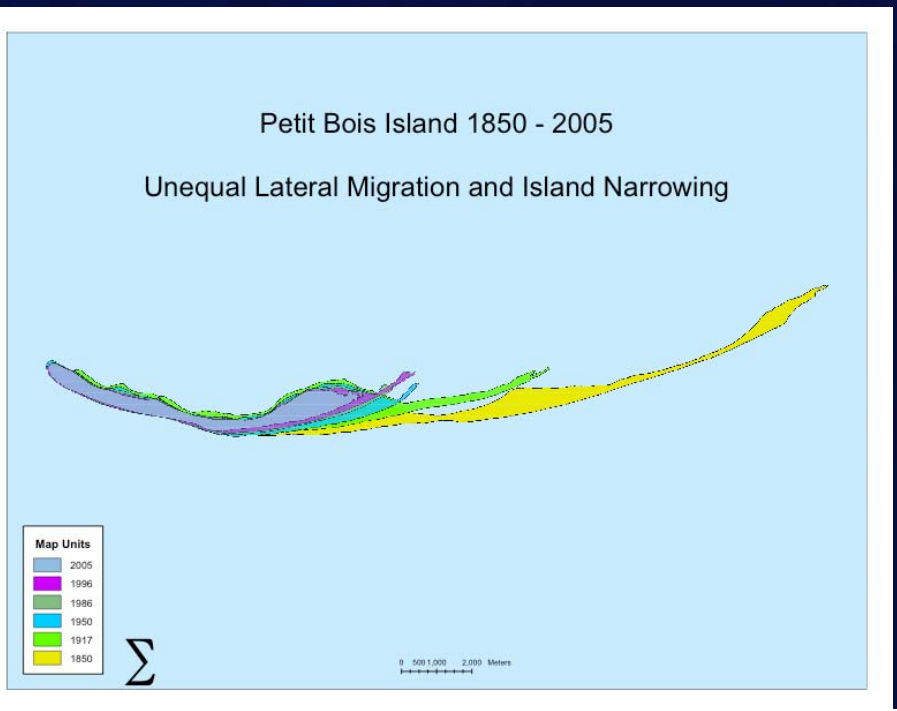
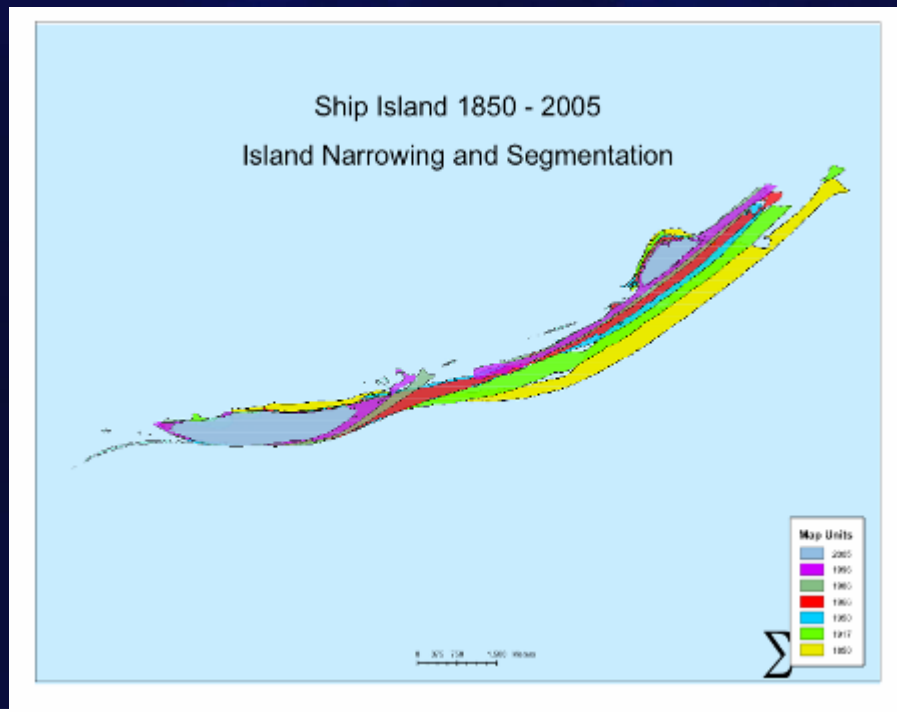
- **Quantify long-term historical morphological changes of the Mississippi-Alabama barrier islands**





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Extreme storm impacts

Pre-Katrina

Post-Katrina

USGS


Thank you!